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GRAUNT OR PETTY ?

THE AUTHORSHIP OF THE *OBSERVATIONS UPON THE BILLS OF MORTALITY*.

THIS article proceeds upon the assumption that the *Natural and Political Observations made upon the Bills of Mortality*, which were published at London in 1662 over the name of John Graunt,¹ occupy by merit and priority² a place in the history of statistics which justifies careful examination of the available evidence bearing on the question whether they were in fact composed by Graunt, or, as is sometimes said, by his friend, Sir William Petty. The question has, indeed, already received the attention of Dr. John Campbell,³ of McCulloch,⁴ of Roscher,⁵ of De Morgan,⁶ of John⁷ and of Cunningham ;⁸ and all of them have agreed that the *Observations* were written, as they purport to be, by Graunt, and not by Petty. In spite, therefore, of Macaulay's dictum⁹ and of Mr. W. B. Hodge's strong argument for Petty,¹⁰ the weight of authority might seem to have settled the dispute in Graunt's favor. But Dr. Bevan, in his recent monograph on Petty,¹¹

¹ The full title runs as follows : *Natural and Political Observations mentioned in a following Index and made upon the Bills of Mortality by John Graunt, Citizen of London ; with reference to the Government, Religion, Trade, Growth, Ayre, Diseases and the several Changes of the said City.*

² Süßmilch's *Die göttliche Ordnung in den Veränderungen des menschlichen Geschlechts* appeared in 1741.

³ *Biographia Britannica* (1757), IV, 2262-2263, note.

⁴ *Literature of Political Economy* (1845), 271.

⁵ *Zur Geschichte der englischen Volkswirtschaftslehre im 16. und 17. Jahrh. Abh. d. k. sächs. Ges. d. Wiss., Bd. iii* (1857), s. 73, note.

⁶ *Assurance Magazine*, VIII (1859), 166, 167 ; *Budget of Paradoxes* (1872), 68, 69.

⁷ *Geschichte der Statistik* (1884), 170.

⁸ *Growth of English Industry and Commerce in Modern Times* (1892), 247, note.

⁹ *History of England* (1868), I, 219, note.

¹⁰ *Assurance Magazine*, VIII, 94, 234-237.

¹¹ Bevan, *Sir William Petty*, *Publications of the Amer. Econ. Assoc.*, vol. ix (1894), no. 4.

has reopened the question, and has given his voice against the opinion hitherto received. In his view, though the weight of authority may be for Graunt, the preponderance of evidence is for Petty; and he certainly adduces testimony calculated, on its face, to shake a reader's faith in the traditional Graunt theory.¹ To me, however, the older opinion that Graunt wrote the book, though never based, perhaps, upon a consideration of all the pertinent facts, seems nevertheless correct. The whole question will, at any rate, bear reëxamination.

In order to understand the relations of Graunt and of Petty to the *Observations*, it is necessary to review the salient facts of their lives down to January, 1662, when the book was published. John Graunt was born April 24, 1620, the son of Henry Graunt, a Hampshire man,² but a citizen of London,³ who carried on the business of a draper at the sign of the seven stars in Birchen Lane. He was educated while a boy in English learning, says Wood, and bound apprentice to a haberdasher of small wares, which trade he mostly followed, though free of the Draper's Company. Probably he succeeded to his father's place of business, as the epistle dedicatory of the *Observations*, which is signed by John Graunt, is dated Birchen Lane, 25 January, 1661½. He passed through the various offices in the government of the City of London as far as common-councilman, holding that office two years, and was captain and major of the trained band. Apparently he was a person of some influence, as he was able to procure for his impecunious friend, Dr. William Petty, an appointment as professor of music in Gresham College, February 7, 1651.⁴ It

¹ Even Lord Edmond Fitzmaurice, though he shows, in general, no inclination to claim overmuch for his ancestor, is so far influenced by Dr. Bevan's argument as to write: "Whatever the explanation may be, a reasonable view probably is that it was a true instance of joint authorship." *Life of Sir William Petty*. London, Murray, 1895. Cf. p. 180. The MS. of the present paper was in the hands of the editors of the *POLITICAL SCIENCE QUARTERLY* before the publication of Lord Fitzmaurice's *Life*. That work has thrown new light on many episodes of Petty's career, but it has necessitated no change of importance in the conclusions herein previously reached.

² Wood, *Athenæ Oxon.* (1721), I, 311.

³ Parish Register 5 of St. Michael, Cornhill (Harleian Soc., 1882), 33.

⁴ Ward, *Lives of the Professors of Gresham College* (1740), 218.

does not appear, however, that Graunt was, before 1662, associated in any intimate way with the group of investigators, many of them connected with Gresham College, who afterwards became the Royal Society. That he was wealthy and a man of position in his world, is further plainly indicated by the references to him in Pepys's *Diary*.¹

William Petty was born May 26, 1623, the son of Anthony Petty, a poor clothier of Romsey in Hampshire.² In 1643 he went to the Continent, studying medicine at Utrecht, Leyden, Amsterdam and Paris. By the year 1647 he had returned to London, and in 1648 he removed to Oxford, where, on the first day of January, 1651, he was made professor of anatomy. On the 7th of February of the same year he received the professorship of music already noted. He was furthermore one of the group of scholars out of whose frequent meetings for the discussion of various questions in natural science, grew finally the Royal Society.

Meanwhile he had been appointed physician to the army in Ireland, where he arrived September 10, 1652.³ Here he had opportunity to observe that the survey of the lands forfeited by the Irish rebels, and intended for paying Cromwell's soldiers, "was most unsufficiently and absurdly managed."⁴ He accordingly offered to make a better survey. His offer was accepted and a contract signed December 25, 1654.⁵ Petty delivered the completed results of his survey in March, 1656; but its accuracy was disputed by the surveyor who had preceded him, and much difficulty arose in the settlement of the accounts. Affairs were further complicated by the dissatisfaction of the "adventurers" in London — persons who had advanced the money for the support of the Protestants in

¹ Jan. 2, 1662; Jan. 23, April 20 and July 31, 1663; and April 26, 1668. Abundantly confirmed by Fitzmaurice, pp. 180, 232.

² Aubrey's *Lives*, in Walker and Bliss' *Letters written by Eminent Persons* (1813), III, 481.

³ See his will; often printed, most accessibly in Fitzmaurice's *Life*, 318-324.

⁴ *Ibid.*

⁵ Cf. p. 29 of Petty's *History of the Cromwellian Survey of Ireland*, edited for the Irish Archæological Society by T. A. Larcom in 1851.

Ireland — with the lands allotted to them in payment. Accordingly, on May 7, 1658, Petty, who had meanwhile become a commissioner for distributing the forfeited lands, clerk of the council in Ireland, and the confidential friend and secretary of the viceroy, Henry Cromwell, was dispatched to London to adjust matters. While he was thus engaged, charges of dishonesty in connection with the survey and of corrupt speculation in lands were brought against him in Dublin. At the end of December, 1658, he returned and confronted his accusers. But before the matter could be settled at Dublin, Sir Jerome Sanchy brought in the House of Commons at London similar accusations against Petty, newly elected a member; and he was summoned by the speaker, March 26, 1659, to appear and answer. He reached London April 17, and defended himself in the House of Commons on the twenty-first. Parliament being dissolved the next day, nothing came of Sanchy's charges, and in May Petty returned to Dublin. Thence he was redispached to England June 16, 1659, as the bearer of Henry Cromwell's letter of acquiescence in the overthrow of the Protectorate. On the twelfth of July, 1659, Sanchy renewed the charges against Petty before the Rump Parliament, which referred them back to the authorities in Ireland. Petty accordingly made another journey to Dublin. Nothing, however, came of the charges there. So he returned once more to London and set diligently at work to defend himself at the bar of public opinion, writing in self-vindication no less than five books.¹

¹ Two of these were published at the time, and one since. The first is a pamphlet entitled: "Brief of Proceedings between Sir Jerome Sanchy and the Author. By W. Petty." This was printed in 1659, and brought the contest down to July 13. The second, written after October, 1659, is his elaborate *History of the Cromwellian Survey*, first published in a quarto volume of 426 pages, in 1851. The third is the octavo volume: "Reflections upon some persons and Things in Ireland, by letters to and from Dr. Petty. London, printed for John Martin, *etc.*" 1660. This was apparently the last written of the five, for in it Petty mentions not only the Brief and the History, but also the other books: "I have also written (as I just now told you) a profest Answer to Sir Hieromes Eleven last and greatest Articles, containing the proofs of what is herein but barely alledged, which I may not publish until after my tryal. [He then mentions the "History,"

Although he had been a favorite of Henry Cromwell, Petty managed to secure royal favor also at the time of the Restoration. He was appointed by Charles II one of the commissioners of claims relating to Irish estates, and was knighted April 11, 1661.¹ He also took an active part in the meetings of the Royal Society,² and was a charter member of its council. On November 27, 1661, he presented to the Society a paper "Of making Cloth with Sheep's Wool,"³ and on the seventh of the following May his "Apparatus to the History of Common Practices of Dying."⁴ In the same year, 1662, there was published his (anonymous) *Treatise of Taxes and Contributions*, which twice cites the *Observations*. Petty thus appears to have been a universal genius; and in his later years he busied himself with writings of a statistical nature, resembling in general character the work whose authorship is under discussion.

Such are the significant facts in the lives of the two friends who may be regarded as rival claimants for the honor of having written the *Observations*. The work purports on its face to be by Graunt. The supporters of Petty attempt to establish his authorship by arguments which may be arranged in three groups: First, those based on the direct testimony of persons who knew Petty, or were his contemporaries; second, internal evidence; third, corroborative probabilities. The supporters of Graunt meet these arguments with counter-arguments of like character. I shall therefore take up the three groups of arguments and counter-arguments successively; and, since the burden of proof appears to rest upon the advocates of Petty, I shall allow them the first hearing.

and continues:] There is another piece of a quite contrary nature, being a Satyre; which though it contain little of seriousness, yet doth it allow nothing of untruth" (pp. 60, 61).

¹ Le Neve's Pedigrees of Knights (Harleian Society, 1873), 133.

² Birch, History of the Royal Society (1756), I, 7, 19, 41, 55-65, 83, 88, 90, etc.

³ Printed in Birch, I, 55-65.

⁴ Printed in Sprat's History of the Royal Society (1667), 284-306.

I.

The direct testimony to Petty's authorship is given by four writers. Of these the first, chronologically, is John Evelyn. In his diary, under date of March 22, 1675, Evelyn writes :

Supp'd at Sr William Petty's with the Bp. of Salisbury and divers honorable persons. We had a noble entertainment in a house gloriously furnish'd; the master and mistress of it were extraordinary persons. [He then recounts briefly and not very accurately the main facts in Petty's life, adding such anecdotes of his career as show that they had been long acquainted. He describes and praises Petty at length and with great enthusiasm, concluding with the words:] He is the author of the ingenious deductions from the bills of mortality, which go under the name of Mr. Graunt; also of that useful discourse of the manufacture of wool, and several others in the register of the Royal Society. He was also author of that paraphrase on the 104th Psalm in Latin verse, which goes about in MS. and is inimitable. In a word, there is nothing impenetrable to him.

The next witness for Petty — and also against him — is his intimate friend, John Aubrey, the antiquary. Aubrey assisted Anthony à-Wood in the compilation of his *Athenæ Oxonienses* by furnishing him a number of "minutes of lives."¹ From his letters to Wood concerning the Lives,² it appears that Aubrey wrote his sketch of Petty in February, 1680, and that shortly before March 27, "Sir W. P. perused my copie all over & would have all stand." In spite, however, of his own care and of Petty's revision, Aubrey's account of the authorship of the *Observations* is not self-consistent. In the early part of the "Life," as printed, he says³ that Petty "was about 1650 elected Professor of Musique at Gresham Colledge, by the interest of his friend Captaine John Graunt (who wrote the

¹ Printed, nearly entire, in vol. iii of "Letters written by Eminent Persons in the Seventeenth and Eighteenth Centuries; to which are added Lives of Eminent Men by John Aubrey. Now first published [by J. Walker and J. P. Bliss]. London: 1813."

² Ballard MS., XIV, ff. 126-132, Bodleian Library.

³ Letters, *etc.*, p. 483.

observations on the Bills of Mortality), and that time was worth but fourtie pounds in all the world." Quite near the end of the "Life," on the other hand, he inserts into a list¹ of Petty's writings the words: "Observations on the Bills of Mortality were really his."

The third witness for Petty is Edmund Halley. As Halley was a much younger man than Graunt or Petty and did not become a fellow of the Royal Society until 1678, his testimony is rather less important than that of Evelyn or Aubrey. He begins his "Estimate of the Degrees of the Mortality of Mankind"² with the words:

The contemplation of the mortality of mankind has, besides the moral, its physical and political uses, both which have some time since been most judiciously considered by the curious Sir William Petty, in his moral and political Observations upon the Bills of Mortality of London, owned by Captain John Graunt. And since in a like treatise on the Bills of Mortality of Dublin. . . . But the deductions from those bills of mortality seemed even to their authors [*sic*] to be defective.

The fourth witness for Petty is Bishop Burnet (1643-1715). His allusion to the *Observations* is casual. In the first volume of his *History of his own Times*, published in 1723, but probably written before 1705, he makes the charge³ that Graunt, being a member of the New River Company, stopped the pipes at Islington the night before the London fire, Sep-

¹ Letters, *etc.*, vol. iii, p. 488. Neither Lord Fitzmaurice nor Dr. Bevan affords help here. Indeed neither, as far as I can discover, so much as mentions Aubrey's first statement. My hope that examination of the original "minutes" in the Bodleian Library (Aubrey MSS., VI, ff. 12-15) might clear up the difficulty has not been fulfilled. It is evident enough that the last paragraph of the printed "minute" on Petty—"Since his death [1687] I have seen in his closet a great many tractatiunculi," *etc.*—was added to the MS. by another hand than Aubrey's, probably by Wood's. But both the statements quoted above seem to be in Aubrey's hand, and so far as I can judge, they were written about the same time.

² Philosophical Transactions, no. 196 (1693), p. 596.

³ Vol. i, p. 231; cited from the Oxford edition of 1833, vol. i, p. 423. The charge against Graunt was thoroughly disproved by Bevil Higgins in his Historical and Critical Remarks on Bishop Burnet's History of his own Times (1725), 149, *apud* Burnet, 424, note; and by Maitland, History of London, new ed. (1775), I, 435.

tember 2, 1666. Burnett's account of this alleged occurrence begins: "There was one Graunt, a papist,¹ under whose name Sir William Petty published his observations on the bills of mortality."

Such is the direct testimony for Petty. The direct testimony in favor of Graunt comes from five sources. First, from the work whose authorship is in issue. Four editions of the *Observations* published during his lifetime and one published by Petty after Graunt's death, all bear on their title-pages Graunt's name as author. Second, Petty's own testimony in his books and in his private correspondence. In his acknowledged writings he mentions the *Observations* at least sixteen times.² The dates of these references are as follows: The "Treatise of Taxes and Contributions," 1662, cites the *Observations* twice, without mentioning Graunt's name at all. The "Discourse concerning the Use of Duplicate Proportion," 1674, justifies its double dedication by the example of "Graunt's" *Observations*. The *Observations upon the Dublin Bills* and the various *Essays in Political Arithmetick*, 1682-1687, cite the original *Observations* eleven times, six times with Graunt's name, and five times without. In the remaining case, the *Political Arithmetick*, as printed in 1690, makes Petty speak of "the observators upon the bills of mortality."³ Since the *Political Arithmetick* was written in 1676, *i.e.*, before Petty's own *Observations upon the Dublin Bills*, this expression might be construed as a claim by Petty to a share in the authorship of the *Observations* of 1662. But reference to a manuscript of the *Political Arithmetick* in the Bodleian Library, bearing Petty's autograph corrections, shows conclusively that he here intended to set up no such claim.⁴

¹ Cf. page 116, *infra*.

² At pages 11, 32, 102, 104, 131, 133, 134, 136, 174 (twice), 182, 183, 184, 193 and 270 of his works, entitled Tracts chiefly relating to Ireland, edition of 1769; and in the Discourse of Duplicate Proportion, not included in that edition.

³ Edition of 1690, p. 97.

⁴ Rawlinson MS., D. 25, f. 23^a. The amanuensis wrote "observators," but Petty doubly corrected the word to "Observer." The like change apparently was not made in the MS. sent to press in 1690.

Moreover, in a private letter to his most intimate friend and relative, Sir Robert Southwell (August 20, 1681), Petty twice speaks of "Graunt's" and once of "our friend Graunt's" book.¹

In connection with Petty's direct testimony on the question, it should be further noted that the title-page of his first published statistical pamphlet runs: "Observations upon the Dublin Bills of Mortality MDCLXXXI and the State of that City. By the Observator on the London Bills of Mortality. London: Printed for Mark Pardoe . . . 1683." This is, I believe, the only independent issue of the Dublin *Observations*, and its title may have been made up by Petty's friend Mark Pardoe, and not by Petty himself. At any rate, when in 1686 Pardoe reissued the same sheets, with additions, under the title of *Further Observations on the Dublin Bills*, Petty's name appears on the title-page, without any mention of the London *Observations*. Nor did the change occur here alone. In the first (1683) edition of "Another Essay in Political Arithmetick. By Sir William Petty," the original Dublin *Observations* are advertised as "by the Observator on the London Bills of Mortality." In the second edition of the Essay, published in 1686, but before the *Further Observations*, the advertisement of the original Dublin *Observations* reads: "By Sir William Petty."

Contemporary testimony in favor of Graunt comes, thirdly, from the Royal Society, and from various members of it. At a meeting of the society on February 5, 1662,

Dr. Whistler brought in a book, intituled, Natural and Political Observations upon the Bills of Mortality, by John Graunt, Citizen of London, printed at London in 1662, in 4to; and the doctor read the epistle dedicatory, addressed to Sir Robert Moray, the president, by the author who sent fifty copies of the book to be distributed among the members of the society; for which thanks were ordered to be returned to him, and he was proposed a candidate.²

At the next meeting, February 12, a committee of six was appointed "to examine Mr. Graunt's Observations upon the

¹ Rawlinson MS., A 178, ff. 71-72, Bodleian Library.

² Birch, vol. i, p. 75.

Bills of Mortality." Their report is not preserved by Birch, but it must have been favorable, for Graunt was elected a member on the 26th of February, and he subscribed his name at the following meeting of the society, March 6.¹ More than three years later, when the plague was approaching London, the society reiterated its opinion, in the words:

Tuesday, June 20, 1665. At a meeting of the Council of the Royal Society. Ordered, that the Observations upon the Bills of Mortality by Mr. John Graunt be printed by John Martyn and James Allestry, printers to the Royal Society.²

The testimony of the Royal Society is confirmed by its secretary, Oldenburg, who during the plague wrote from London to Boyle, under the date of September 18, 1665:

Though we had some abatement in our last week's bill, yet we are much afraid it will run as high this week as ever. Mr. Graunt, in his appendix to his Observations upon those bills (now reprinted) takes notice, that forasmuch as the people of London have, from Anno 1625 to this time, increased from eight to thirteen, so the mortality shall not exceed that of 1625, except the burials should exceed 8400 per week.³

Further confirmation is found in the work of the Society's first historian, Bishop Sprat. Its members, Sprat says, are free from pedantry and prejudice;

and that they are likely to continue in this comprehensive temper hereafter, I will shew by one instance: and it is the recommendation which the King himself was pleased to make of the judicious author of the Observations on the Bills of Mortality: In whose election it was so far from being a prejudice that he was a shop-keeper of London; that His Majesty gave this particular charge to His Society, that if they found any more such tradesmen, they should be sure to admit them all, without any more ado.⁴

The testimony of the two remaining witnesses for Graunt has not, I believe, been presented upon any previous trial of

¹ Birch, vol. i, pp. 76, 77.

² Notice printed in 3d, 4th and 5th editions of the Observations.

³ Boyle's Works (1744), V, 335.

⁴ Sprat, History of the Royal Society (1667), p. 67.

this case. The first is John Bell, author of *London's Remembrancer*.¹ Bell's book, issued just after the great plague of 1665, was intended to rectify "the many and gross mistakes which have been imposed upon the World, by divers Ignorant Scribblers about the weekly Accompts of former Visitations." He explains and defends the manner in which the bills of mortality were prepared by the Company of Parish Clerks, and proceeds:

I think I need not trouble myself herein [*i.e.*, in describing the form of the bills], since that worthy and ingenious Gentleman, Captain John Graunt, in his Book of Natural and Political Observations on the Bills of Mortality, hath already so well described them.

Now the author of the *Observations* asserts² that he visited the hall of the Parish Clerks, and used their records in the preparation of his book. Bell, therefore, who was in charge of the Clerks' register, could scarcely have been deceived as to the identity of the author.

The other new witness for Graunt is Sir Peter Pett. Pett was born, probably, in 1627. He was at Oxford while Petty was there; he was a charter member of the Royal Society; he was certainly acquainted with Petty, and probably with Graunt.³ In 1688 he published a folio volume designed to vindicate the Earl of Anglesey from the charge of being a Roman Catholic.⁴ This gigantic pamphlet discusses many matters not germane to the charge against Anglesey, and among them England's growth in population. In the course of the discussion Pett alludes three times to the *Observations* without mentioning the name of either Petty or Graunt:

¹ *London's Remembrancer: or, A True Account of every particular Week's Christnings and Mortality. . . . Taken out of the Register of the Company of Parish Clerks of London . . . by John Bell, Clerk to the said Company.* London: E. Cotes, 1665, 4^o.

² Edition of 1676, Preface.

³ Fitzmaurice's Life, pp. 248-250, makes it evident that Sir William and Sir Peter were intimately acquainted.

⁴ *The Happy Future State of England; or, A discourse by Way of Letter to the Late Earl of Anglesey.* London: printed MDCLXXXVIII. *Anon.*

If any of our monkish historians . . . had given the world rational estimates of the numbers of . . . the males then between the ages of 16 and 60 [from the military returns] . . . we might now easily by the help of what we have from the *Observer* on the Bills of Mortality conclude, what the entire number of the people then was. [Page 91.]

'Tis very remarkable that in the Code Louys which he [Louis XIV] published in April, 1667, he made some ordinances with great care for the registering the christenings and marriages and burials, in each Parish . . . having perhaps been informed by his ministers that many political inferences, as to knowing the number of people and their encrease in any state, are to be made from the bills of mortality, on the occasion of some such published about 3 years before by the *Observer* on the Bills of Mortality in England. [Page 249.]

It must be acknowledged that the thanks of the age are due to the *Observer* on the Bills of Mortality for those solid and rational calculations he hath brought to light, relating to the numbers of our people: but such is the modesty of that excellent author that I have often heard him wish that a thing of so great publick importance to be certainly known, might be so by an actual numbering of them. . . . Mr. James Howel . . . saith, that in the year 1636 . . . the Lord Mayor of London . . . took occasion to make a cense of all the people and that there were of men, women and children, above 7 hundred thousand that lived within the barrs of his jurisdiction alone . . . and . . . more now. . . . But I am to suspect that there was no such return in the year 1636 . . . and do suppose that Mr. Howel did in that point mistake . . . partly because I find it mentioned by the curious *Observer* on the Bills of Mortality, p. 113 and 114 [of the 1676 ed.] that anno 1631, ann. 7 Caroli I. the number of men, women and children in the several wards of London and liberties . . . came in all to but 130178, and finally because the said curious *Observer* (for that name I give the author after My Lord Chief Justice Hales [*sic*] hath given or adjudged it to him in his *Origination of Mankind*) having by rational calculations proved that there dyes within the Bills of Mortality a thirtieth part, or one in thirty yearly, and that there dies there 22000 per annum . . . If there were there according to Howel a million and a half people, it would follow that there must dye but 1 out of 70 per annum. [Pages 112-113.]

In these passages from Pett two peculiarities need to be explained. The first is the omission of Petty's name. If Pett

regarded Petty as the author of the *Observations*, why should he consistently omit to mention him here as "Sir W.P."—a form of reference which he repeatedly uses when speaking elsewhere of Petty's other works?¹ The second fact to be explained is Pett's manifest desire to avoid mentioning by name "that excellent author," "the most curious Observator." It certainly is not by chance that Pett, whose laborious book is a medley of duly credited extracts from almost all English and classical literature, instead of mentioning the author of the *Observations*, here carefully took refuge behind a quotation—or rather a misquotation²—from Sir Matthew Hale. I believe that Pett's peculiar course at this point can be best explained on the assumption that he considered Graunt the author of the work. He was attempting, at a time when Oates' absurd stories of the popish plot were still heartily believed, to vindicate Anglesey from the charge of leaning towards Roman Catholicism. He was therefore careful not to betray any sympathy with the Romanists. Now according to Wood, when Graunt had been a major two or three years, he

then laid down his trade and all public employments upon account of religion. For though he was puritanically bred, and had several years taken sermon-notes by his most dextrous and incomparable faculty in short-writings and afterwards did profess himself for some time a Socinian, yet in his later days he turned Roman Catholic, in which persuasion he zealously lived for some time, and died.³

May not this explain Pett's obvious unwillingness to praise the author of the *Observations*, Graunt, by name? Pett does not afford demonstration, but he furnishes corroboration.

¹ Pp. 92, 106, 122 192, 193, 245, and p. 1 of the preface.

² Hale's *Primitive Origination of Mankind* considered and examined according to the Light of Nature, published in 1677, the year after his death, was probably written before 1670. The passages (pp. 205, 206) which allude, with warm praise, to the *Observations*, do not, so far as I can see, give or adjudge the name of Observator to the author at all. Hale quotes the title of "this little book," but makes no mention of its author.

³ Concerning the disadvantages to which Graunt was subjected on account of his faith, and concerning the misfortunes of his later years, Fitzmaurice's *Life of Petty* (pp. 232-235) gives new details.

II.

The second group of arguments includes all those, whether advanced by supporters of Petty or of Graunt, which appeal to internal evidence. Here, again, the supporters of Petty shall speak first. They point out many and striking similarities between passages in the *Observations* and parts of Petty's acknowledged writings published at the same time, or soon after. These similarities constitute, in the opinion of Dr. Bevan,¹ "an effective way of testing" this question of authorship. In view of the inaccessibility of the books, and the importance of the test, I will here reprint all the obvious and important passages discovered by previous writers, together with a few parallels which I have myself chanced upon. They are a formidable array.

OBSERVATIONS (1676 ed.).

PAGES 27, 28 : The vast number of *Beggars*, swarming up and down this City, do all live, and seem to be most of them healthy and strong; whereupon I make this question, Whether, since they do all live by begging, that is, without any kind of labour; it were not better for the State to keep them, even though they earned nothing? that so they might live regularly. . . . Some may Object, That *Beggars* are now maintained by voluntary Contributions, whereas in the other way the same must be done by general Tax; and consequently, the Objects of Charity would be removed and taken away. To which we Answer, That in *Holland*, although no where fewer

TREATISE (1662 ed.).

PAGE 12: When all helpless and impotent Persons were thus provided for [in "Receptacles for the aged, blinde, lame &c. in health; Hospitals for . . . Diseases . . . Orphans . . . found and exposed Children"], and the lazy and thievish restrained by the Minister of Justice, it follows now, that we finde out certain constant Employments for all other indigent people, who labouring according to the Rules upon them, may require a sufficiency of food and raiment. . . . It will be asked, who shall pay these men? I answer, every body.

PAGE 13: Now as to the work of these supernumeraries, let it be with out expence of Foreign Commodities, and then 'tis no

¹ Bevan's Petty, p. 44.

Beggars appear to charm up commiseration in the credulous, yet no where is there greater or more frequent Charity : only indeed the Magistrate is both the *Beggar*, and the *Disposer* of what is got by *begging*.

matter if it be employed to build a useless Pyramid upon *Salisbury Plain*, . . . or the like ; for at worst this would keep their mindes to discipline and obedience, and their bodies to patience of more profitable labours.

PAGE 63 : Sometimes the State is common Beggar, as 'tis almost in *Holland*, where particular Charity seems only to serve for the relief of concealed wants . . . and not so much to relieve any wants that are declared, and already publickly known.

PAGES 69, 70 : In *Popish* Countries, where *Polygamy* is forbidden, if a greater number of *Males* oblige themselves to *Cælibate*, than the natural over-plus, or difference between them and *Females* amounts to ; then multiplication is hindered [This is undesirable] forasmuch as Princes are not only Powerful, but Rich, according to the number of their People (Hands being the Father, as lands are the Mother and Womb of Wealth).

EPISTLE TO LORD ROBERTS : The *Trade*, and very *City of London*, removes Westward.

PAGE 75 : The City of *London* gradually moves *Westward*, and did not the *Royal Exchange* and *London-Bridge* stay the Trade, it would remove much faster. . . . The reasons whereof are . . . Thirdly, where the *Consumption* of a Commodity is, *viz.* among

PAGE 8 : I might also say, that forasmuch as there be more Males than Females in *England*, (the said difference *pro tanto* hindering procreation) that it were good for the Ministers to return to their Cælibat.

PAGE 49 : We are now to remember in consequence of our opinion, (That Labour is the Father and active principle of Wealth, as Lands are the Mother) that the State by killing . . . their members, do withall punish themselves.

PAGE 23 : Now if great Cities are naturally apt to remove their Seats, I ask which way? I say, in the case of *London*, it must be Westward, because the Windes blowing near $\frac{3}{4}$ of the Year from the West, the dwellings of the West end are so much the more free from the fumes, steams, and stinks of the whole Easterly Pyle ;

the Gentry, the Venders of the same must seat themselves.

PAGE 78: We incline therefore to think the Parishes should be equal, or near, because, in the *Reformed Religions*, the principal use of *Churches* is to Preach in.

PAGE 98: The Art of Governing and the true *Politicks*, is how to preserve the Subject in *Peace* and *Plenty*. . . . Now, the Foundation or Elements of this honest harmless *Policy* is to understand the Land, and the hands of the Territory, to be governed according to all their intrinsick and accidental differences: As for example; It were good to know the *Geometrical* Content, Figure, and Situation of all the Lands of a *Kingdom*, especially according to its most natural, permanent, and conspicuous Bounds. It were good to know how much Hay an Acre of every sort of Meadow will bear; how many Cattel the same weight of each sort of Hay will feed and fatten; what quantity of grain and other Commodities the same Acre will bear in one, three or seven years, *communibus Annis*; unto what use each soil is most proper. All which particulars I call the intrinsick value: for

which where Seacole is burnt is a great matter. Now if it follows from hence, that the Pallaces of the greatest Men will remove Westward, it will also naturally follow, that the dwellings of others who depend upon them will creep after them.

PAGE 6: One cause of Publick Charge in Matters of Religion, is the not having changed the limits of Parishes and Cures with the Change of Religion from Popery.

PAGE 31: I propound a Survey of the Figures, Quantities and Situations of all the Lands both according to the civil bounds of Parishes, Farms, &c., and the natural distinctions thereof by the Sea, Rivers, ridges of Rocks, or Mountains, &c. I propound that the quality of each denomination were described by the Commodities it had usually born, in some Land, some sort of Timber, Grain, pulse or root growing more happily than in others: Also by the encrease of things sown or planted, which it hath yielded *communibus annis*; and withall, the comparative goodness of the said Commodities not unto the Standard money, but to one another. As for example; if there be ten acres of Land, I would have it judged whether they be better for Hay or Corn; if for Hay, whether the said ten Acres will bear more or less Hay than ten other Acres; and whether a hundred weight of the said Hay

there is also another value merely accidental, or extrinsick, consisting of the Causes why a parcel of Land, lying near a good Market, may be worth double to another parcel, though of the same intrinsick goodness; which answers the Queries, why Lands in the *North of England* are worth but sixteen years purchase, and those of the *West* above eight and twenty. It is no less necessary to know how many People there be of each Sex, State, Age, Religion, Trade, Rank, or Degree, &c. by the knowledge whereof, Trade and Government may be made more certain and Regular; for if men knew the People, as aforesaid, they might know the consumption they would make, so as Trade might not be hoped for where it is impossible. As for instance, I have heard much complaint, that Trade is not set in some of the *South-western* and *North-western* parts of *Ireland*, there being so many excellent Harbours for that purpose; whereas in several of those places I have also heard, that there are few other Inhabitants, but such as live *ex sponte creatis*, and are unfit Subjects of Trade, as neither employing others, nor working themselves.

Moreover, if all these things were clearly and truly known (which I have but gessed at) it would appear, how small a part

will feed or fatten more or less, then the same weight of other Hay. . . . This former I call a Survey or Inquisition into the intrinsick values of land, this latter of extrinsick or accidentall follows. . . . [Previously Petty had said, p. 30: "Lands intrinsickally alike near populous places . . . will not onely yield more Rent for these Reasons, but also more years purchase then in remote places." He now begins his calculation of the extrinsic value of lands by a discussion of the relative values of gold and silver, and of the same coin at different times, and then proceeds to explain how, by reckoning with the price of labor, the produce of different lands and the cost of working them, their rents can be ascertained, and concludes, page 34:] Against all this will be objected, that these computations are very hard if not impossible to make; to which I answer onely this, that they are so, especially if none will trouble their hands or heads to make them, or give authority for so doing: but withall, I say, that until this is done, Trade will be too conjectural a work for any man to employ his thoughts about.

[The remarks about Ireland can be paralleled without exception by passages, too long to quote, from Petty's *Political Anatomy of Ireland*, written about 1672.]

PAGE 16: If people be so few,

of the People work upon necessary Labours and Callings, *viz.* how many Women and Children do just nothing, only learning to spend what others get ; how many are meer Voluptuaries ; and as it were meer Gamesters by Trade ; how many live by puzzling poor people with unintelligible Notions in Divinity and Philosophy ; how many by persuading credulous, delicate, and litigious Persons, that their Bodies or Estates are out of Tune, and in danger ; how many by fighting as Souldiers ; how many by Ministries of Vice and Sin ; how many by Trades of meer Pleasure or Ornaments ; and how many in way of lazy attendance, &c. upon others : And on the other side, how few are employed in raising and working necessary Food and Covering ; and of the speculative men, how few do study *Nature* and *Things* ! The more ingenious not advancing much further than to write and speak wittily about these matters.

as that they can live, *Ex sponte Creatis*, or with little labour, such as is Grazing, &c., they become wholly without Art.

PAGE 9 : And moreover, if by accompt of the people, of their Land and other wealth, the number of Lawyers and Scriveners were adjusted, I cannot conceive how their should remain above one hundredth part of what now are.

REFLECTIONS (1660).

PAGE 139 : I had rather learn and labour to get my own living, than by lying and loytering under the name of Preaching, to be a drone on other Mens.

POLITICAL ARITHMETIC

(ed. 1690).¹

PAGE 38 : I say, if the Stock of these Men should be diminished by a Tax, and transferred to such as do nothing at all, but *eat* and *drink*, *sing*, *play*, and *dance* ; nay to such as study the *Metaphysicks*, and other needless *Speculation* . . . the Wealth of the Publick will be diminished.

Not all of these parallels are of equal weight in our discussion. That on the westward movement of London is scarcely significant of a common authorship, John Evelyn having set the idea afloat in the preceding year.² In like manner the talk about equalizing the parishes was apparently a current commonplace. On the other hand, the remaining parallels, especially the last, are doubtless important.

In addition to these parallel passages, other similarities are pointed out. "The most noticeable thing in the first few

¹ Written *ca.* 1676.

² Evelyn's *Fumifugium* (1661), p. 16.

pages of the 'Bills,' " says Dr. Bevan, "is the amount of space devoted to a description of different diseases. They are described with a familiarity and precision which only a physician could be expected to have."¹ Upon a layman the discussions, in chapters two and three, of the similarities between rickets and liver-growth, and between the green sickness, stopping of the stomach, mother, and rising of the lights, undoubtedly make a learned impression. Whether they were, in fact, the discussions of a learned or of an ignorant man, a specialist in the history of English medicine before Sydenham could probably say. But one need not be a medical antiquarian to see that, in the most elaborate of these discussions, the one concerning rickets and liver growth, and indeed, throughout all the discussions of this sort, the method of the writer of the *Observations* is distinctly statistical, is marked, indeed, by considerable statistical acuteness, and is scarcely at all diagnostic or pathological, as a physician's method, nowadays at any rate, would probably be. He enquires whether the same disease has been returned in different years under different rubrics; and he finds his answer by investigating the fluctuations from year to year in the number of deaths from each. Moreover, it is in the midst of these discussions of diseases that the variations in the number of those who died of rickets from year to year provokes this curious passage :

Now, such back-startings seem to be universal in all things; for we do not only see in the progressive motion of wheels of *Watches*, and in the rowing of *Boats*, that there is a little starting or jerking backwards between every step forwards, but also (if I am not much deceived) there appeared the like in the motion of the *Moon*, which in the long *Telescopes* at *Gresham Colledge* one may sensibly discern. [Page 36.]

De Morgan points out² the improbability that "that excellent machinist, Sir William Petty, who passed his day among the astronomers," should attribute to the motion of the moon in

¹ Bevan's Petty, p. 46.

² Budget of Paradoxes (1872), 68; *Assurance Magazine*, VIII, 167.

her orbit all the tremors which she gets from a shaky telescope.¹

Other peculiarities of the *Observations* which are held by Dr. Bevan to indicate Petty's authorship are the "references to Ireland derived apparently from personal observation," and the fact that "Hampshire, Petty's native county, is the only English county mentioned."² The latter argument might have been made much stronger for Petty. The author of the *Observations* bases many of his most interesting conclusions upon a comparison between the tables of London mortality and the "Table of a Country Parish." This country table is unquestionably based upon the parish register of the Abbey of St. Mary and St. Athelfleda, at Romsey, the church in which Petty's baptism is recorded and in which he lies buried.³ As for the two allusions to Ireland, on the other hand, they signify little or nothing. One of them is simply in connection with Graunt's belief (page 43), that deaths in child-bed are abnormally frequent "in these countries where women hinder the facility of their child-bearing by affected straightening of their bodies . . . what I have heard of the Irish women confirms me herein." The passage, it is obvious, no more indicates personal observation in Ireland than does the other,⁴ where the writer says, "I have heard . . . I have also heard" this and that about Ireland.

Those who have agreed that Graunt was the author of the *Observations*, need not leave to their opponents the exclusive use of internal evidence. They, for their part, may first point

¹ Mr. Hodge replies : "The paragraph objected to stands unaltered in the fifth edition, edited by Petty, and the question naturally arises, how came he to publish as an editor that which, it is asserted, he must have known to be so grossly absurd that it is impossible he could have published it as a writer?" (*Assurance Magazine*, VIII, 235, 236.) This is ingenious, but fallacious. The fifth edition is a reprint, not a revision.

² Bevan's Petty, 46.

³ This fact has, I believe, escaped observation hitherto. A comparison of the transcript from the Abbey register contained in vol. iii of Dr. John Latham's Collections for a History of Romsey (British Museum Addl. MS. 26776, f. 14) with Graunt's table leaves in my mind no doubt that the "market town" Graunt describes is, in fact, the old town on the Test.

⁴ Quoted in full above, p. 120.

out that there are considerable differences of language between Petty's works and Graunt's.¹ Every one at all familiar with seventeenth-century English pamphlets has sympathized with Sir Thomas Browne's solicitude lest "if elegance still proceedeth, and English pens maintain that stream, which we have of late observed to flow from many, we shall within few years be fain to learn Latin to understand English." Petty's *Reflections* and his *Treatise of Taxes and Contributions* are about the same size as the *Observations*. I have run through all three and counted the Latin words, phrases and quotations, excluding those which, like *anno*, *per annum*, *per centum*, are virtually English. The *Reflections*, in the 154 pages which are indisputably by Petty,² contain at least twenty-four Latin phrases, the *Treatise* at least forty-two. The *Observations* show, aside from the sentiment on the title-page,³ but five Latin phrases; and of the five, three are within as many pages of the "Conclusion" (pages 97-99), in precisely the passage which exhibits the most conspicuous of all the parallels between the *Observations* and the *Treatise*.⁴

The supporters of Graunt may properly claim, in the second place — and upon this they may insist, for it has not received adequate emphasis heretofore — that the statistical method of the *Observations* is greatly superior to the method of Petty's acknowledged writings upon similar subjects. Graunt exhibits a patience in investigation, a care in checking his results in every possible way, a reserve in making inferences, and a caution about mistaking calculation for enumeration, which do not characterize Petty's work to a like degree. To point out the differences in detail would require another paper as long as

¹ Dr. Bevan (p. 44) would dissent: "It is difficult to discover any great diversity in style, language, or in any other point between the 'Bills' and Petty's authentic writings."

² The letters ostensibly addressed to Petty were probably written by him, but, to be on the safe side, I excluded them. Fitzmaurice's *Life of Petty* also speaks (p. 92) of "the imaginary correspondent to whom the 'Reflections' are a reply."

³ Non, me ut miretur turba, laboro, Contentus paucis lectoribus.

⁴ Mr. Higgs has pointed out also (*Economic Journal*, no. 17, p. 72) that Graunt feared London was "too big," whereas Petty wished it still bigger.

this. But they cannot escape any person of statistical training who may read carefully first the *Observations* and then Petty's *Essays*.

In the third place, it deserves to be noted that the chief parallels to Petty's writings do not occur in parts of the *Observations* which are vital or organic. In his patient investigations of the movement of London's population, imperfect and frequently erroneous though they were, and, for lack of data, necessarily must have been, the author of the *Observations* displays admirable traits for which Petty's writings, however meritorious otherwise, may still be searched in vain. The passages in which the parallels occur are, as it were, the embroideries with which Graunt's solid work is decorated — possibly by Petty's hand. For example, the passage concerning beggars and charity in Holland¹ is appended to the contention that, since "of the 229,250, which have died, we find not above fifty-one to have been starved, except helpless infants at nurse," therefore there can be no "want of food in the country, or of means to get it." The argument is statistical; the appended passage about beggars is not. It has no real connection, and if it were omitted, the argument proper would lose nothing of its cogency. The longest and closest parallel between the *Observations* and the *Treatise* is of like character. It occurs in and indeed pervades "The Conclusion."² And this conclusion, instead of offering, as one might expect, a sober summary in the style of the book itself,³ is a manifest and, one must own, a not altogether unsuccessful attempt "to write wittily about these matters."

III.

The arguments of the third group — those based upon the probabilities of the case — should be considered as corroborated.

¹ Above, p. 118.

² Nearly two-thirds of the conclusion is quoted above, pp. 120-122.

³ The stylistic similarity of the conclusion to Petty's writings, and its dissimilarity to the earlier parts of the *Observations* is noted by Mr. Hodge, *Assurance Magazine*, VIII, 235.

tive, rather than as of independent weight. In advancing them the partisans of each writer must seek rather to strengthen a case already built up by direct testimony and internal evidence than to establish their contentions *de novo*.¹ In general, the probabilities strongly favor Graunt. In the first place, he was a citizen and a native of London. He thus had opportunity to collect the bills and incentive to study them; and the author's account of the way in which he came to make the study tallies with the known facts of Graunt's life in every particular. Petty, on the other hand, was a provincial by birth, and had been a resident of London but a short time when the *Observations* were published. In the second place, the *Observations* are not the product of a few leisure hours, or even of a few hurried weeks. Their laborious compilation demanded time — how much, those will best appreciate who have attempted similar tasks. Graunt may well have had the necessary leisure, whereas Petty, in defending his Irish survey, in writing for the Royal Society, and in working for political self-advancement at the Restoration, must have been otherwise well occupied during the years 1660 and 1661.² In the third place, the assumption that a man of Graunt's standing in the city would consent to be a screen for Petty's book, has never been put upon a sound basis, or indeed upon any basis at all. Finally it may be noted that the *Observations* contained nothing offensive;³ they were not only novel, but popular, and it was by no means Petty's nature to refuse credit for a good thing he had done.⁴ Nevertheless the *Observations* had been out

¹ McCulloch and Roscher take the contrary course.

² Cf. above, p. 108. Fitzmaurice's *Life of Petty* now gives (pp. 102–107) ample proof that political and business complications absorbed much of Petty's time in the months following the Restoration.

³ Lord Shelborne, Petty's son, says in his dedication of the 1690 edition of the *Political Arithmetick* that, though written "long since," it was not published until after the Revolution, because the "doctrines of this essay offended France." It was, as a matter of fact, printed in 1683, but without Petty's name, and under the title: *England's Guide to Industry*.

⁴ His "Treatise" was indeed published anonymously, but when it succeeded, its authorship soon became known. — Cf. the "Suppliment" to "Brief Observations concerning Trade and Interest of Money. By J[osiah] C[hild]. London, Printed for Elizabeth Calvert. 1668."

almost fifteen years, had passed through four editions, and had received unusual honors at the hands of the Royal Society, and apparently of the king also, before there was a whisper of Petty's authorship.

Opposed to these probabilities in favor of Graunt stand two analogous arguments for Petty. One argument Dr. Bevan advances: "We are not able to assign a reason for Petty's wish to conceal his authorship under the name of a friend, but we do know that several of his works were published anonymously during his lifetime."¹ It needs scarcely to be said that publishing a book anonymously is a different thing from publishing it under the name of somebody else—and that somebody a well-known man. The other argument is put by Mr. Hodge in these words:

If I were disposed to argue the matter upon probabilities, I might ask what other proof Graunt gave of his capacity for writing such a work. . . . It is certainly strange, if Graunt were the man, that he should have stopped short after having made such a remarkable step. Of Petty's abilities for dealing with the subject it is unnecessary to speak.²

The argument that Graunt cannot have written one book because he did not write a second,³ is scarcely of a cogency sufficient to prevail against the favorable opinion of those who knew him. Anthony à-Wood, for instance, professes to give only "an exact history of all the writers and bishops who have had their education in the most antient and famous University of Oxford." Yet he goes out of his way to append to a sketch of Edward Grant, the classicist, an account of John Graunt, who owed his education to no university. And Wood has no doubt that Graunt could have written the book; for he describes Graunt as

the most ingenious person (considering his education and employment) that his time has produced. . . . The said John Graunt was an

¹ Bevan's Petty, p. 43.

² *Assurance Magazine*, VIII, 236.

³ In fact he did write two others, if Wood is to be believed; but they were not published.

ingenious and studious person, generally beloved, was a faithful friend, a great peacemaker, and one that had often been chosen for his justness and prudence an arbitrator: but above all his excellent working head was much commended, and the rather for this reason, that it was for the public good of learning, which is very rare in a trader or mechanic.¹

Pepys, also, who seems to have known Graunt well, accepted his authorship without the slightest hesitation.

IV.

To sum up the whole discussion: The *Observations* were published over Graunt's name. Everything about them, as well as everything known of his life, was consistent with the assumption that he wrote them; he had the incentive, the opportunity, the time, and in the opinion of his contemporaries the ability. The book was at once accepted by intelligent people as his, and unusual honors were bestowed upon him. Until after his death (1673) he was generally esteemed the author of the work. Between 1675 and 1705, however, four persons attributed the book to Petty; and later writers have pointed out striking resemblances between passages in the *Observations* and passages in Petty's avowed writings. It is substantially upon the testimony of Evelyn and of Aubrey and upon these similarities, that the whole case for Petty rests. Before we can admit Petty's authorship we must be convinced that Graunt and Petty, aided and abetted by Bell, were parties to a singularly purposeless² conspiracy whereby, with remarkable shrewdness in covering their tracks and giving to their fraud the appearance of truth, they deceived not only the general public but also their intimates in the Royal Society. Does the evidence adduced for Petty so far outweigh the evidence

¹ Wood, *Athenæ Oxon.* (1721), I, 311.

² Mr. Hodge says: "It is not necessary for us to determine what could have been Petty's object in making such an arrangement,—whether it was for some personal convenience or advantage to himself or to gain a reputation for Graunt." (*Assurance Magazine*, vol. viii, p. 235.) It is, to be sure, not necessary; but does not absence of motive suggest doubt as to the fact?

for Graunt as to convince us that they were guilty of this contemptible conduct? If not, can the direct testimony for Petty, and the similarities noted, be explained without conceding the authorship of the *Observations* to him? I believe that they can be so explained.

In view of Evelyn, Aubrey and the parallel passages on one hand, and of the strong evidence for Graunt on the other, it seems almost certain that neither Graunt nor Petty was the exclusive author of all parts of the *Observations*, as we have them. There is, moreover, competent authority for this view. Anthony à-Wood, speaking of Petty's *Observations on the Dublin Bills*, published in 1683, says: "He also long before assisted or put into a way John Graunt in the writing of his Nat. and Pol. Observations on the Bills of Mortality of London." And in his sketch of Graunt, Wood says: "He hath written . . . Natural and Political Observations . . . done upon certain hints and advice of Sir William Petty." That is to say, Graunt and Petty collaborated. But the character of their collaboration was, I believe, rather complementary than coöperative. They were not, properly speaking, "joint authors." The essential and valuable part of the *Observations* seems to be Graunt's. Petty probably assisted him with comments upon medical and other questions here and there; procured the figures from Romsey for the "Table of the Country Parish"; and may have suggested, or even written, the Conclusion, and possibly, also, the curious "epistle dedicatory to Sir Robert Moray," commending the book and its author to the Royal Society. Such assistance constituted authorship neither in Petty's mind nor in the mind of any one else. But when Petty, who had perhaps assisted in the enlargement of the third edition,¹ 1665, was preparing for the press a fifth edition, again enlarged, of the ever-popular *Observations*, he for the time being persuaded himself that he was their author. After-

¹ The appendix added to this edition gives much information as to the plague in continental cities, taken in part from an (unidentified) book "printed at Amsterdam, 1664." Petty certainly knew Latin and French, perhaps Dutch also; Graunt had only an English education.

wards he thought better of it, and assigned the honor to Graunt, to whom it rightfully belonged. All this seems, I am aware, an elaborate edifice of shaky conjecture. I hope so to shore it up with chronological props that it may present at least the appearance of stability.

The fifth edition of the *Observations* is dated "London, 1676." Inasmuch as Petty went to Ireland in the winter of 1675-76, it is not unlikely that the book was published early in the latter year. Now Evelyn gives the earliest intimation of a Pettian authorship after supping at Petty's house in 1675. In 1680 Aubrey, in an account "perused" by Petty, first assigns the *Observations* to Graunt, and then asserts that they were "really" Petty's. Halley and Burnet were, as already noted, less intimate with Petty; what they say is of little independent weight. Meanwhile Petty seems to have repented. When, in 1682 and in subsequent years, he has occasion in his later works to mention the *Observations*, he repeatedly speaks of them as Graunt's, and that although he specifically cites the fifth edition, in which his own share was larger than in the others. Moreover, the title-page and the stationer's advertisement of 1683,¹ indirectly attributing the London *Observations*

¹ A list of Petty's works, in his own handwriting, apparently made in 1682, and brought to light by Lord Fitzmaurice in 1895, includes an entry, under the year 1660, of *Observations on the Bills of Mortality*. Nevertheless, Lord Fitzmaurice, although manifestly influenced by Dr. Bevan, whose dissertation on Petty he had read in its "privately printed" form, still comes, in spite of all, to substantially the conclusion reached above: "Already at a very early period of his career he [Petty] had given attention to the collection and examination of statistics, and had earned thereby the good-will and support of Captain Graunt. Graunt . . . had for some time been collecting materials for his '*Observations on the Bills of Mortality of the City of London*,' which appeared in 1661 [O.S.], and is the first work of the kind published in the English language. It was generally believed at the time [!]¹ that Graunt had received material assistance from Petty, and that he was to be regarded as the literary patron rather than as the real author. Bishop Burnet and Evelyn were both of this opinion [but not "at the time"; cf. above, pp. 110, 111], which the numerous parallelisms between the '*Bills*' and Sir William's own work, the '*Treatise on Taxes*,' go far to support, different though the two books are in style and in some of the views expressed. On the other hand, it is difficult to understand why Sir William in this particular case should have sheltered himself under the name of a friend, instead of publishing the book anonymously, as he did several of his works. Whatever the explanation may be, a reasonable

to Petty, were at the first opportunity altered to a form consistent with what appear to be the facts.

In short, the *Observations upon the Bills of Mortality of London* are essentially Graunt's work, and he deserves the credit for them. Petty probably made contributions to the book which may have helped to bring it to popular, and even to scientific notice, but he added little, if anything, to its real merits. He edited it in 1676 with further additions, and for a while caused or allowed it to be supposed that he was the author. Subsequently he corrected the error. The general conclusion thus reached makes Graunt in every proper sense the author of the *Observations*. This conclusion is by no means new. But those who have held it have not hitherto explained the countervailing testimony for Petty; nor can it be explained save by a chronological examination of the evidence. Consequently one party has accepted Evelyn and Aubrey, while the other party has ignored them. The attempt here made to explain the testimony for Petty, without forgetting the stronger testimony for Graunt, seeks to correlate the facts, and to harmonize the probabilities more completely than has heretofore seemed possible. The opinion that Graunt, and not Petty, was really the author of the *Observations*, I hope thus to have raised in the minds even of readers who do not forget Evelyn and Aubrey, to the grade of probability, if not to that of demonstration.

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view probably is that it was a true instance of joint authorship. That Sir William had some hand in it can hardly be doubted, owing to the frequent mention of Ireland, which is so characteristic of all his works, and the wealth of medical illustration, which Graunt could hardly have supplied himself." — *Life of Petty*, p. 180.